Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Bandgap opening in graphene templates on Ru(0001) from subsurface hydrogen effects studied by STM, LEED, and DFT[1] MAXWELL GRADY, University of New Hampshire, BOGDAN DIACONESCU, Sandia National Laboratory, DARREN VALOVCIN, University of New Hampshire, FRANK HAGELBERG, East Tennessee State University, KARSTEN POHL, University of New Hampshire — Graphene has aroused tremendous interest due to its remarkable electronic and mechanical properties. Graphene's optical properties, conductance, and the fact that it can be transferred to many substrates make it an ideal candidate for use in nanoelectronic devices and organic photoelectric devices. The lack of a bandgap, however, causes a serious challenge for implementing graphene as a material for electrical switches and therefore creative ways of inducing this bandgap are needed. We will present a STM/LEED/DFT study of the single layer graphene on Ru(0001) system in the presence of hydrogen. Structural studies show arrays of moiré superlattices with sizes ranging from 0.9 to 3.0 nm in the presence of hydrogen on the compact surface of ruthenium. First principle calculations help explain the appearance of these arrays of graphene reconstructions driven by the H presence at the Ru(0001) interface, and furthermore, predict the appearance of a bandgap with values correlated with the moiré superstructure sizes in the presence of hydrogen. Control over moiré superstructure size can aid in future work using graphene as a nanotemplate for self assembled growth of nanoelectronic devices an organic photovoltaics.

[1]This work was supported by the Nanoscale Science and Engineering Center for High-rate Nanomanufacturing (NSF NSEC-425826) and NSF DMR-1006863

Maxwell Grady
University of New Hampshire

Date submitted: 31 Jan 2013 Electronic form version 1.4